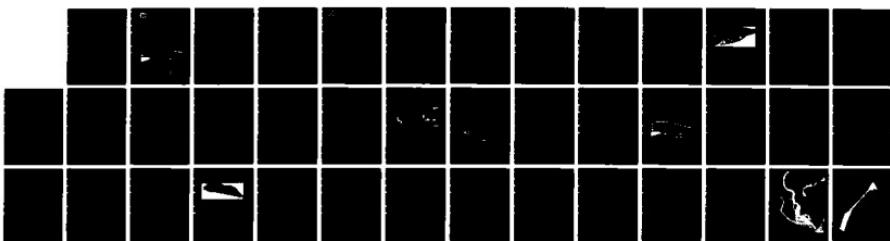


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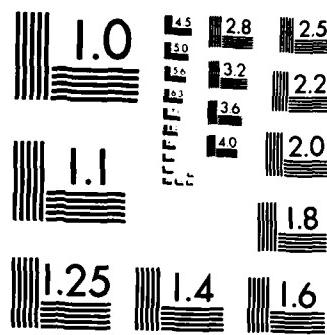
REVIEW OF REPORTS CHARLESTON HARBOR SOUTH CAROLINA TEXT 1/1
WANDO RIVER EXTENSION REVISION(U) CORPS OF ENGINEERS
CHARLESTON SC CHARLESTON DISTRICT JUN 84

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FINAL REPORT

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REVIEW OF REPORTS

US Army Corps
of Engineers

Charleston District
South Atlantic Division

CHARLESTON HARBOR, S. C.

TEXT

WANDO RIVER EXTENSION

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SUBJECT: Review of Reports on Charleston Harbor, Wando River Extension, SC -
51210

DA, South Atlantic Division, Corps of Engineers, 510 Title Building,
30 Pryor Street, S.W., Atlanta, Georgia 30303 19 March 1984

TO: Board of Engineers for Rivers and Harbors, Kingman Building,
Fort Belvoir, Virginia 22060

I concur in the recommendations of the District Engineer.

Forrest T. Gay III

FORREST T. GAY, III
Brigadier General, USA
Commanding

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report recommends the locally dredged Wando River Channel be deepened to 40 feet and made a part of the existing Charleston Harbor Project.		



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
CHARLESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 919
CHARLESTON, S.C. 29402

REVIEW OF REPORTS ON CHARLESTON HARBOR

WANDO RIVER EXTENSION

PREPARED BY
U.S. ARMY
CORPS OF ENGINEERS
CHARLESTON DISTRICT
SOUTH ATLANTIC DIVISION

JANUARY 1984

Syllabus

The South Carolina State Ports Authority dredged a channel 35 feet by 450 feet in the Wando River from the Charleston Harbor Federal Navigation Project to its newly constructed terminal facilities adjacent to Hobcaw Creek in the summer of 1981. This report presents the engineering, economic, and environmental studies conducted to determine the advisability of maintaining and deepening this locally-dredged channel. Study of this feature of Charleston Harbor was accomplished in compliance to seven congressional resolutions, the latest of which was adopted 19 October 1967 by the Committee on Public Works of the United States House of Representatives and Section 6 of the Rivers and Harbors Act of 1945.

Since the site of the terminal facilities and channel is set, the usual technique of analyzing conditions and solutions by examining a wide range of alternatives was not considered necessary. The only alternatives considered were Federal adoption of the existing 35-foot deep channel and channel deepening. Based on the results of this study, it is concluded that the most economically feasible plan for satisfying future harbor needs consists of maintaining and deepening the locally-dredged channel to -40 feet mean low water datum in the Wando River. It is, therefore, recommended that the Charleston Harbor Navigation Project be modified to add the State's Wando channel to the project and to deepen this segment to 40 feet when similar depths are provided in ocean connecting reaches.

Deepening would be by the United States after congressional authorization and funding and after required items of non-Federal sponsorship are provided. The annual cost to the Federal Government for maintaining the existing 35 X 450' channel is estimated at \$223,000. The total Federal first cost for the recommended plan of improvement would be \$2,714,000, with annual charges of \$517,000, including \$292,000 for the resulting increase in annual maintenance dredging. Total annual benefits, annual costs and B/C ratio for the recommended plan are \$1,377,000, \$552,000, and 2.5 to 1, respectively.

Following deepening, the Federal Government would continue to maintain project depths in the improved channel. Non-Federal interests would maintain commensurate depths at dock facilities. Ocean dumping is the recommended means of disposing the dredged material from the proposed modifications. If the special equipment required to transport the dredged material to sea is not available at the time of initial construction of the project, upland areas on Daniel Island will be used. Should the upland area be used, non-Federal interests would maintain all levees and spillways of project disposal areas.

Dredging would be contracted to private dredging companies. The dredging and disposal plan represents the most economical alternative (NED Plan) with minimal adverse environmental impacts.

REVIEW OF REPORTS
ON
CHARLESTON HARBOR
WANDO RIVER EXTENSION

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SUPPLEMENT TO REPORT

Supplemental Analysis of Cost Recovery Impact Required by
EC1105-2-124, 16 December 1983

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REVIEW OF REPORTS ON CHARLESTON HARBOR

WANDO RIVER EXTENSION DRAFT REPORT

Authority

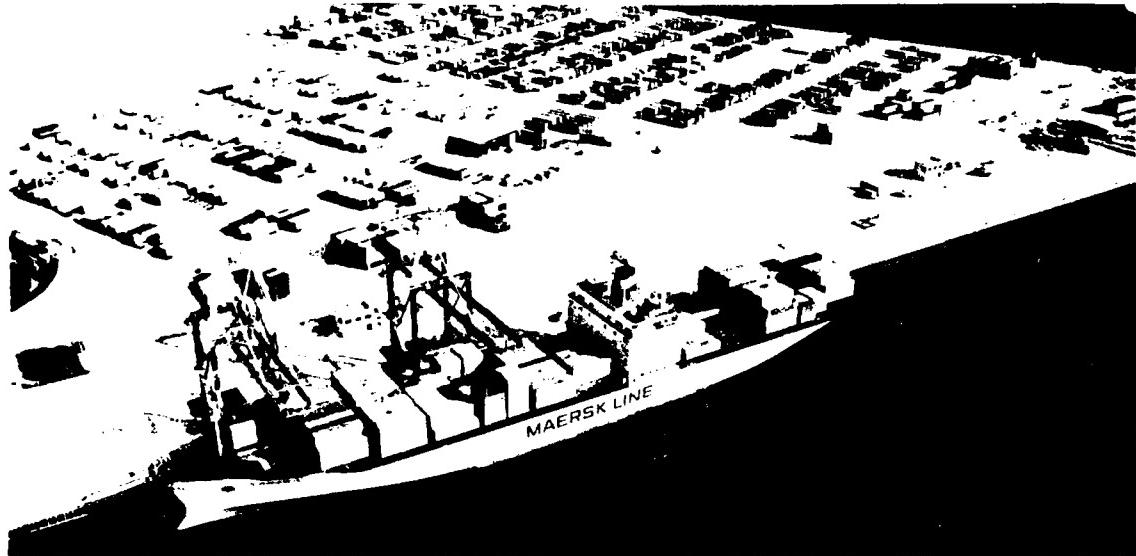
This review of reports completes the compliance to seven congressional resolutions, the latest of which was adopted 19 October 1967 by the Committee on Public Works of the United States House of Representatives and Section 6 of the River and Harbor Act of 1945. Copies of these resolutions are presented in Appendix A.

Introduction

PURPOSE AND SCOPE

This report will consider the Federal takeover and modification of the Wando River deep draft navigation channel. This channel was dredged in the summer of 1981 by the South Carolina State Ports Authority to connect their newly constructed terminal facilities adjacent to Hobcaw Creek with the existing Charleston Harbor project. An Interim Report on Charleston Harbor was completed in October 1974 and was submitted to Congress on 29 March 1976 by the Secretary of the Army. This interim report recommended that the existing project be modified to provide for channel depths of 42 feet in the outer bar and jetty channels, 40 feet in the inner channels and 38 feet in Shipyard River with various channel and basin widenings. Phase I studies were authorized by the 94th Congress in Section 101 of the Water Resources Act of 1976. These Phase I studies have been completed.

The Wando River extension was not considered in the Interim or Phase I reports because a firm commitment had not been made to the Wando site at the time the Interim recommendation was made. Subsequent to this, necessary permits were acquired, legal questions were settled, an EIS was prepared, terminal facilities were constructed, and a 35-foot deep by 450-foot wide channel was constructed. Operation of the terminal facilities commenced in November 1981.



The scope of study has been limited to a certain degree since the site of the terminal facilities and channel are set. With this limited scope the usual technique of analyzing conditions and solutions by examining a wide range of alternates is not considered necessary. There is no need to duplicate the assessments and coordination that went into the consideration of the SCSPA permits and the issuance of the draft and final EIS for these permit actions. Environmental evaluations center on the laws, regulations and policies which apply to Federal projects and which would not necessarily have been considered in the issuance of a permit to a non-Federal applicant. Economic studies include investigations to determine the present and prospective commerce to be moved over the waterway and the benefits which would accrue to the project extension. Engineering studies include hydrographic surveys, soil borings, feature designs, and quantity and cost estimates.

STUDY PARTICIPANTS AND COORDINATION

Charleston District was assigned the responsibility for the conduct and coordination of this study, consolidation of information from other agencies and local interests, formulation of a plan and preparation of this report. A multi-disciplinary team was used to accomplish these tasks. The team was composed of a project engineer, biologist, economist, cost estimator, and a foundations and material specialist. Additional assistance was provided by real estate appraisers, surveyors, and others as specific data and analysis were required.

All known interested Federal, state, and local agencies and individuals were notified of the initiation of this study. Conferences were held with representatives of the South Carolina State Ports Authority and private industry. The study process has been coordinated with the U. S. Fish and Wildlife Service and the Environmental Protection Agency as well as with appropriate state and local agencies. A public meeting was held 13 December 1979.

PRIOR STUDIES AND REPORTS

Information regarding previous reports relating to the existing Federal navigation project for Charleston Harbor, South Carolina are listed in Appendix A.

STUDIES BY OTHERS

The following studies were used by the South Carolina State Ports Authority in the decision process followed in locating their terminal facilities on the Wando River.

- a. "Oceanborne Shipping: Demand and Technology Forecast" by Litton System Inc. (June 1968)
- b. "Master Plan - South Carolina State Ports Authority" by Kaiser Engineers. (October 1969)
- c. "Wando River Environmental Quality Studies, An Interim Report" by the South Carolina Water Resources Commission. (April 1973)
- d. "Updated Master Plan - South Carolina State Ports Authority" by Kaiser Engineers. (October 1973)
- e. "Analysis of Environmental Impact of Port Development" by Arthur D. Little, Inc. (September 1974)
- f. "Impact of the State Ports Authority Upon the Economy of South Carolina" by David R. Pender and Ronald R. Wildon. (October 1974)
- g. "Wando River Terminal Master Plan Report, South Carolina State Ports Authority" by Wilbur Smith and Associates. (May 1979)

Project Description

EXISTING CONDITIONS

The existing authorizations for Charleston Harbor provide for Navy and commercial navigation consisting of: (a) a commercial channel 35 feet deep from the Atlantic Ocean to the Navy Ammunition Depot (NAD) channel (mile 15.6) with varying widths; (b) a channel 35 feet deep and 500 feet wide through Town

TABLE 1
SUMMARY FIRST COST AND ANNUAL CHARGES
WANDO RIVER - OCEAN DISPOSAL

Item	Plan 2 35 X 450	Plan 3 38 X 450	Plan 4 40 X 450
FIRST COSTS			
Federal	\$ -	\$1,515,000	\$2,714,000
Non-Federal	- -	<u>142,000</u>	<u>203,000</u>
Total First Cost	\$ - -	<u>\$1,657,000</u>	<u>\$2,917,000</u>
ANNUAL CHARGES			
Federal			
Int and Amort	\$ -	\$126,000	\$225,000
Maintenance	223,000	261,000	292,000
Total Federal	<u>\$ 223,000</u>	<u>\$387,000</u>	<u>\$517,000</u>
Non-Federal			
Int and Amort	\$ -	\$ 12,000	\$ 17,000
Maintenance	14,000	16,000	18,000
Total Non-Federal	<u>\$ 14,000</u>	<u>\$ 28,000</u>	<u>\$ 35,000</u>
TOTAL ANNUAL CHARGE			
Federal	\$ 223,000	\$387,000	\$517,000
Non-Federal	14,000	28,000	35,000
TOTAL	<u>\$ 237,000</u>	<u>\$415,000</u>	<u>\$552,000</u>

Note: Increase in maintenance dredging for deepening only reflects experience observed in similar channels in the District.

1983 prices and include an allowance of 20 percent for contingencies. (Twenty percent is used for ocean disposal only since it is assumed Wando River will be done in conjunction with the Charleston Harbor dredging.) These estimates also include engineering and design, and supervision and administration costs. Annual charges are based on an interest rate of 8 1/8% with a project life of 50 years. Table 1 summarizes the costs for plans 2 thru 4 using ocean disposal.

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mentally acceptable disposal method. Upland disposal would temporarily destroy farmland, wildlife habitat, and woodlands. These effects are discussed more fully in Appendix E.

In a report required by the Fish and Wildlife Coordination Act, the U. S. Fish and Wildlife Service made the following recommendations:

1. Institute initial and maintenance dredging schedules during the fall and early winter months to insure minimal impacts on the Wando's nursery function.
2. Deposition of spoil materials in the Charleston Harbor offshore disposal area with an associated post-disposal benthic study of the disposal area.

The Charleston District concurs with these recommendations and will implement them to the extent practicable. As dredging schedules would have to be made in conjunction with schedules for Charleston Harbor, timing of dredging in the fall and early winter may not always be possible. Close coordination with the U. S. Fish and Wildlife Service will continue in order to avoid adverse environmental effects should the harbor projects be implemented.

PROJECT COSTS

Estimated first costs and annual maintenance costs for plans 2 thru 4 using ocean disposal and upland disposal methods are displayed in Appendix D. These costs are based on the assumption that the Wando River Channel will be constructed in conjunction with the deepening of the Charleston Harbor Project. The estimated cost for the plan requiring upland disposal of dredged material is estimated independently of cost for dredging Charleston Harbor, since Charleston Harbor is recommended to be accomplished by ocean disposal. The costs are based

CHANNEL DESIGN

Traffic in the Wando River would be limited to vessels using the South Carolina State Ports Authority terminal. From 3 to 7 vessels would be expected to traverse the channel daily. Since this reach is only two miles long, two-way traffic is not considered necessary for the density of traffic expected. Based on criteria discussed in detail in Appendix D, a channel width of 450 feet would be needed. The adoption of this width was influenced by a current differential across the mouth and also in the upper end when the ebb current is running at full strength. The U. S. Coast Guard stated that there is validity in incorporating these factors in the design as suggested by the pilots.



ENVIRONMENTAL CONSIDERATIONS

The major environmental concern for the modification of the Wando River channel is related to the disposal of dredged material. Two locations for disposal, on land and in the ocean, have been analyzed in detail, and the results of these analyses are contained in an Environmental Impact Statement published in April 1976 for the proposed Charleston Harbor deepening (See Appendix A). The U. S. Fish and Wildlife Service and the U. S. Environmental Protection Agency have concurred that ocean disposal would be the most environ-

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A width of 350 feet was sought by the South Carolina State Ports Authority in their original permit request. This was modified in the spring of 1981 to 450 feet as a result of a request by the Charleston Pilots Association. The larger width was ultimately dredged by SCSPA. Correspondence explaining the need for the additional 100 feet of width is presented in Appendix G.

Alternative Plans

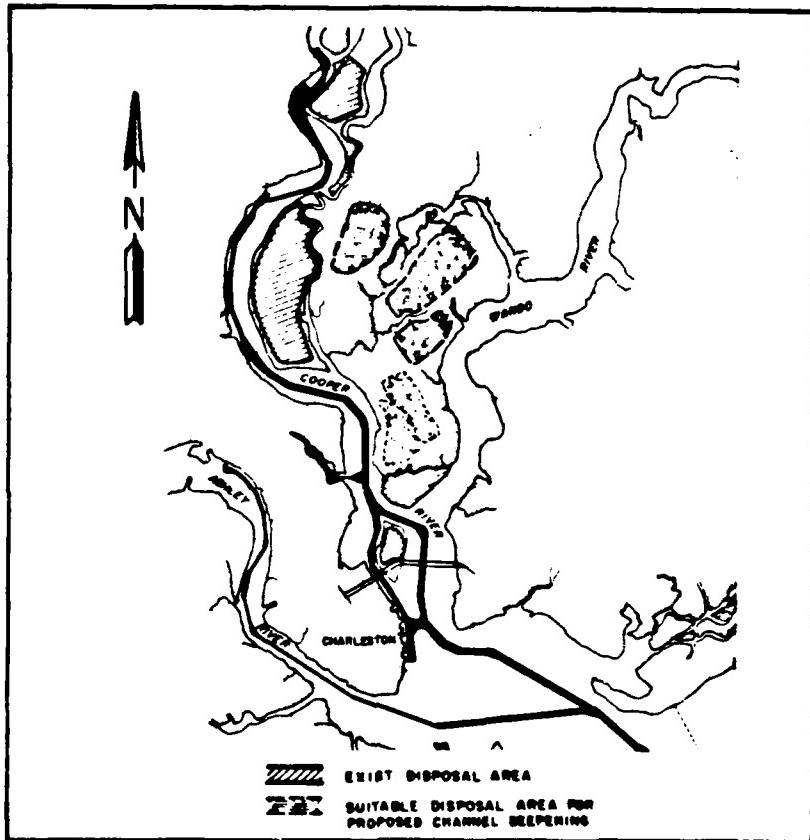
As previously discussed, the Wando River channel to the SCSPA terminal has already been dredged to 35 feet. Therefore, other than adoption of the existing channel, no true alternatives exist other than in design depth and width of the channel and turning basin, and in disposal methodology.

PLANS CONSIDERED

Four different plans of action are open to the Federal Government. The first is the no-action plan. The second plan would authorize Federal takeover for maintenance of the State's existing 35-foot deep channel as constructed to a width of 450 feet. Plans 3 and 4 would consider deepening the existing channel to 38 feet and 40 feet, respectively, with a 1200' X 1200' turning basin at comparable depths.

Plan 1, the no-action plan, is developed only as a basis for the evaluation of outputs of the other developmental alternatives. For the purpose of this report it is assumed the maintenance of the existing channel is discontinued in 1990 and that the channel will stabilize at a depth of 32 feet by the year 2000.

Some uncertainty remains as to whether this type dredge will be available for Charleston Harbor at the time of construction; therefore, the economic and environmental impacts were assessed for both ocean and upland disposal. The same upland areas on Daniel Island investigated during Phase I studies on Charleston Harbor will be used should this method be employed. Both methods of disposal are economically justified by a wide margin.

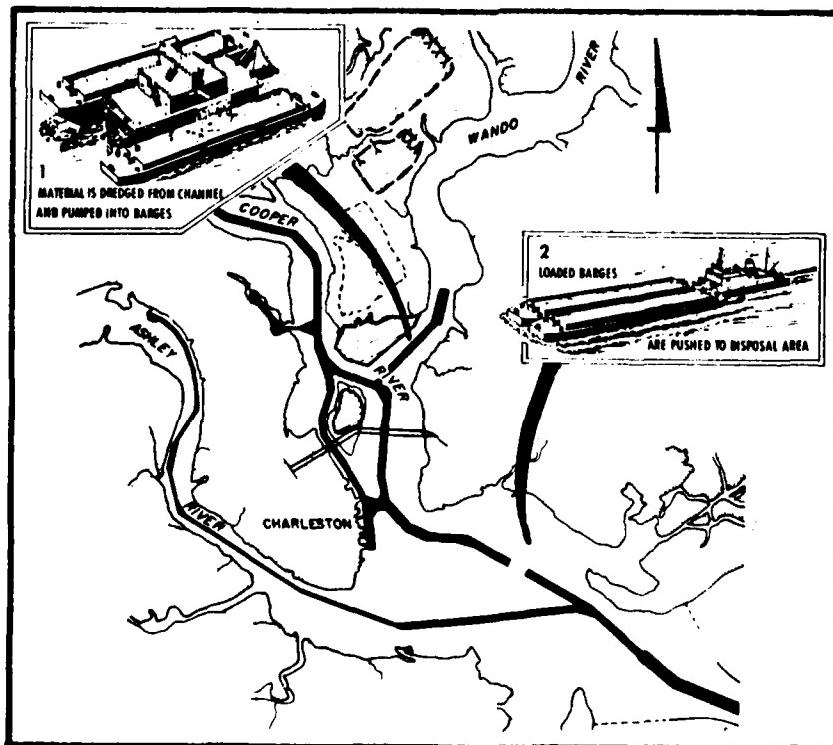


Traffic in the Wando River Channel is, for the most part, limited to vessels using the South Carolina State Ports Authority terminal near Hobcaw Creek with only a limited number of vessels going upstream to a private shipyard. Approximately 3 to 7 vessels per day can be expected at this terminal when the facilities are fully operational. Since this reach is only two miles in length, two-way traffic is not considered necessary for the density of traffic expected. Designs, therefore, reflect one-way traffic only.

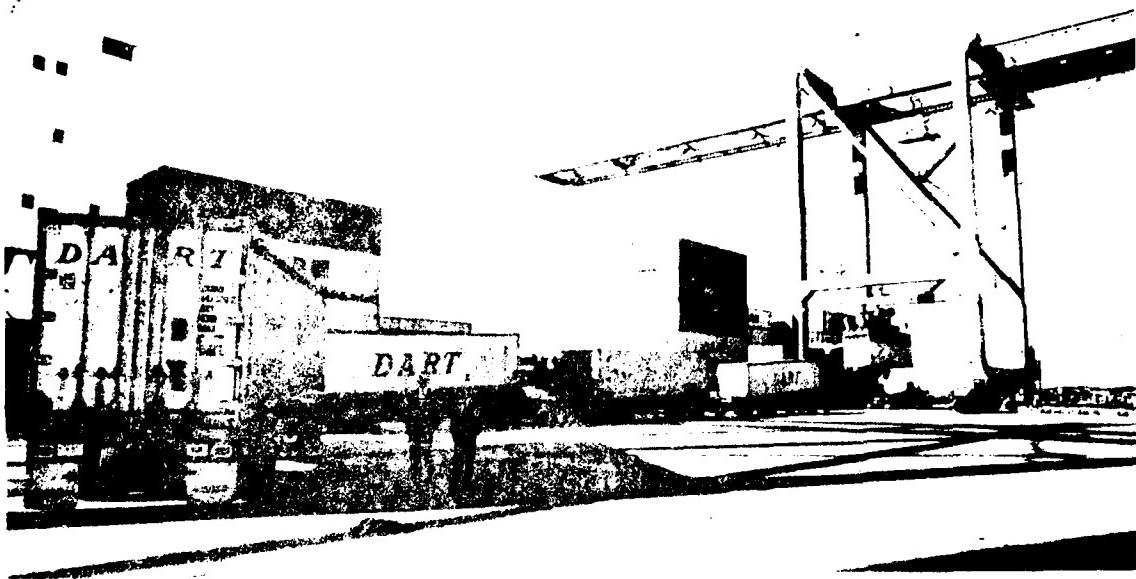
PLANNING CONSTRAINTS

Since Charleston Harbor is an existing navigation project and since the channel extension in the Wando River has been constructed as well as the terminal facilities, alternatives which fulfill project needs are limited. A number of alternatives to channel modification were discussed in the interim review of reports on Charleston Harbor and none these plans provided an acceptable alternative to deepening. A review of the alternatives in the Phase I studies reconfirmed these findings.

The dredging industry has been making significant advances in upgrading existing equipment to discharge a high solid mixture. These technological and industrial advancements makes barging of dredged material competitive with land disposal. For the purpose of this report it is considered that the dredged material will be dumped in the Atlantic Ocean. The methodology is illustrated below and would be as follows: 1) initial removal of material by a special dredge, 2) direct pumping of the material into hopper barges located alongside the dredge, and 3) conveying the material to sea by the barges for disposal.



b. To determine if the existing navigation project should be modified in any way at this time to assist in the development, conduct, safety, and efficiency of waterborn commerce - interstate and foreign.

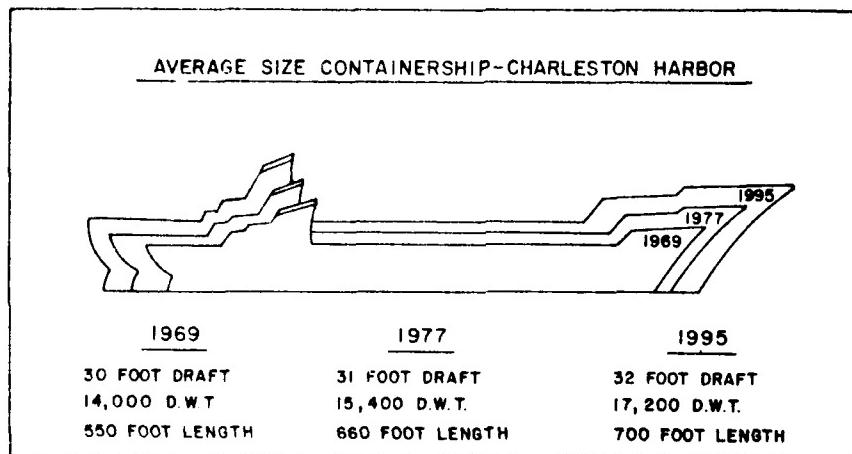


Environmental objectives are limited by the narrow scope of the study to:

- a. Avoidance of unnecessary impacts associated with dredging or the disposal of dredged material.
- b. Reduction in the severity of unavoidable impacts.
- c. Mitigation, where possible, for the unavoidable adverse effects on the natural resources due to the construction and maintenance of the channel.

GROWTH IN VESSEL SIZE

A need for greater depths to accommodate container vessels is apparent. This need will grow as the older converted type vessels are replaced by the larger vessels now being built which are specifically designed for container transport. The average container vessel in the fleet has increased in draft, dwt, and length and is expected to continue along this trend in the future. This is illustrated in the diagram shown below.



Plan Formulation

PLANNING OBJECTIVES

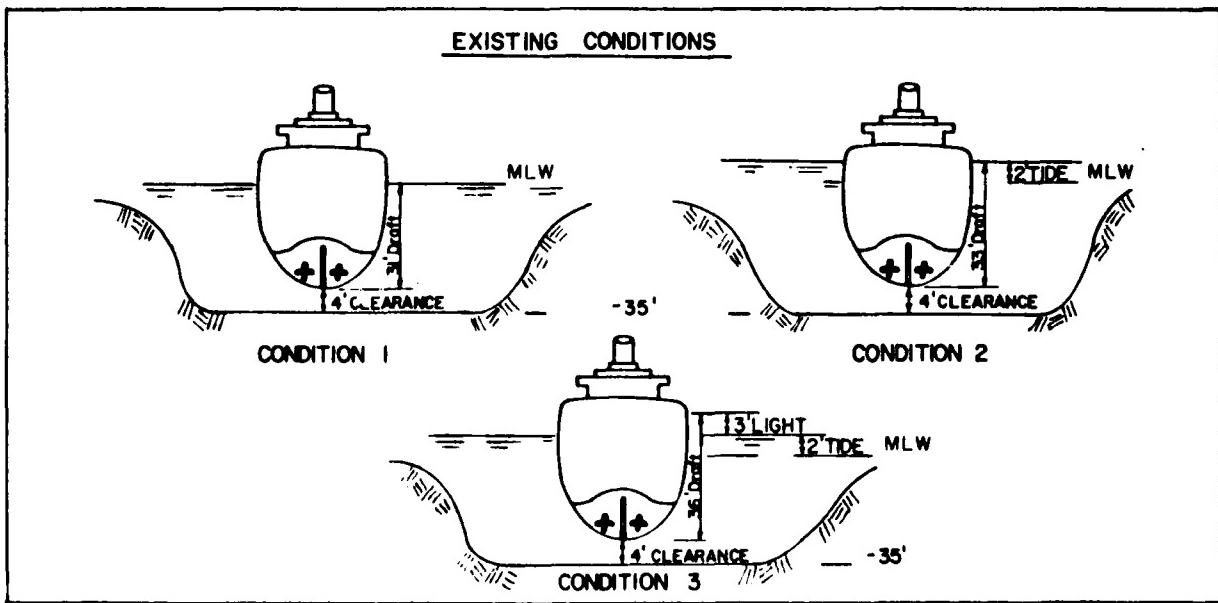
The planning objectives established for Charleston Harbor (Wando River) are as follows:

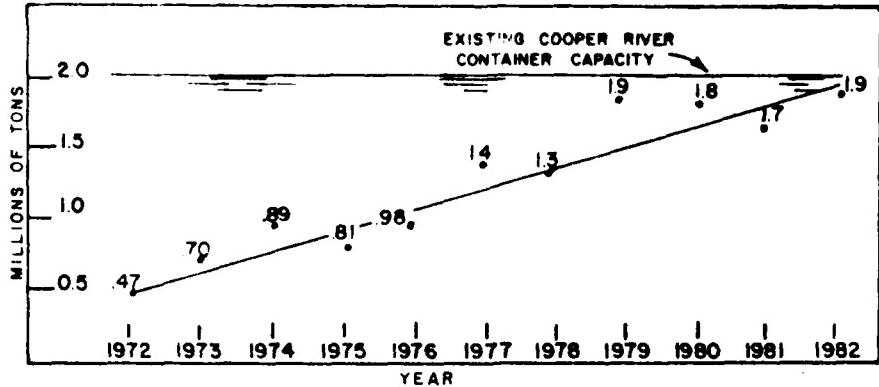
- a. To determine whether it is in the Federal interest to assume maintenance of the existing non-Federal channel, and

having to utilize to the fullest extent the available tidal advantage. The South Carolina State Ports Authority, therefore, deepened the channel to 35 feet to accomodate the larger container vessels now in service. This depth is the same as that currently being maintained in Charleston Harbor.

In reality 35 feet of depth is inadequate for the larger vessels in the world fleet. Many of the vessels currently using Charleston Harbor are having to utilize the tidal advantage even when light loaded. This of course, increases the transportation costs for the commodities transported. There are also many instances where the lack of sufficient depths in Charleston Harbor has prevented vessels from making port calls, thus reducing the growth potential for commerce growth.

The following illustration depict how the larger vessels operate in Charleston Harbor. A depth of 35 feet mlw restricts the safe passage of vessels over the waterway at low tide to a loaded draft of 31 feet. A four-foot clearance is considered necessary between the vessel keel and channel bottom to insure maneuverability and safety.





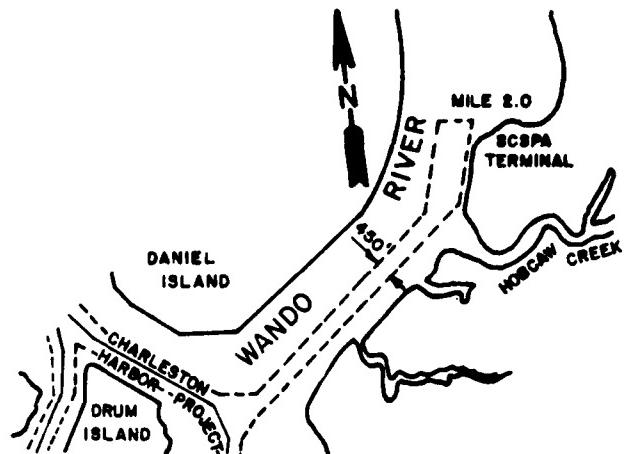
STORAGE CAPACITY

The large growth in commerce had overtaxed existing Ports Authority terminals prior to the construction of the Wando Terminal. Backup storage use, a vital factor in the containerships trade, was also approaching full capacity. The need for additional facilities, therefore, was apparent. Studies by the Ports Authority reveal that suitable additional areas on the west bank of the Cooper River are not available, therefore, the Wando site was chosen for expansion purposes. Studies by the Corps of Engineers in connection with the Phase I Engineering Report on Charleston Harbor Deepening Project indicate an urgent need for additional facilities would exist without the Wando Terminal. These facilities, therefore, are essential to the growth of the Federal Project to its fullest potential.

DEPTH REQUIREMENTS

In order to meet future needs and to improve the efficiency of its then current operation, the Ports Authority constructed a terminal on the Wando River. Natural Wando River channel controlling depth at that time was 28 feet. At this depth only those vessels having a draft of 28 feet or less would have been able to utilize the new terminal fully loaded, with the deepest of these

There is no authorized Federal project currently in the Wando River. The South Carolina State Ports Authority has dredged a channel 35 feet deep and 450 feet wide from the Charleston Harbor Federal project to a turning basin opposite their dock, a total distance of approximately 2.0 miles.



FUTURE CONDITIONS

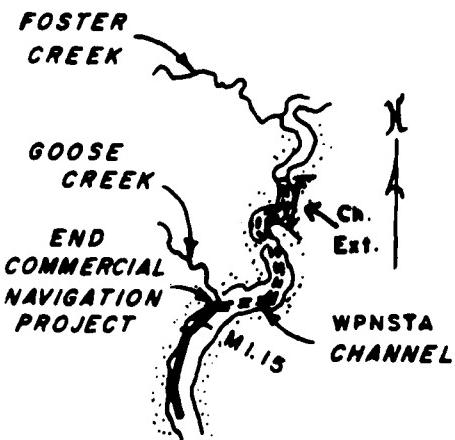
If no Federal action is taken, the South Carolina State Ports Authority will probably continue to maintain their Wando channel.

Problems And Needs

GROWTH IN CONTAINER CARGO

A deepened channel in Wando River is essential to allow the South Carolina State Ports Authority to obtain maximum use of the terminal facilities under construction on the Wando River. These facilities are being developed because of the rapid growth in container cargo over the past decade. The containerized commerce increased from 93,021 tons in 1968 to 470,000 tons in 1972. Growth has continued to outstrip all expectations with about 1.0 million tons in 1976 increasing to over 1.9 million tons in 1982. The chart below plots the Container Cargo growth over the past decade. Over 470,000 tons were handled over the Wando terminal during 1982.

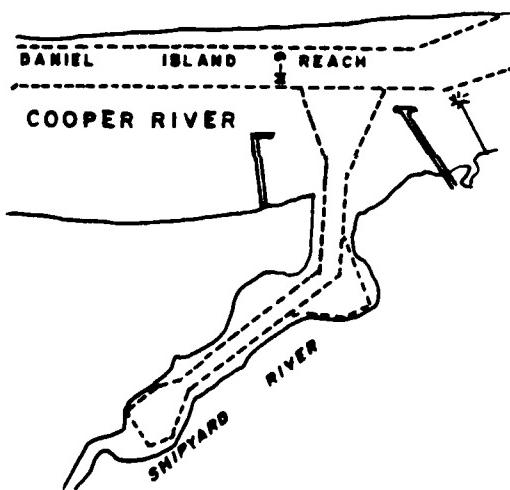
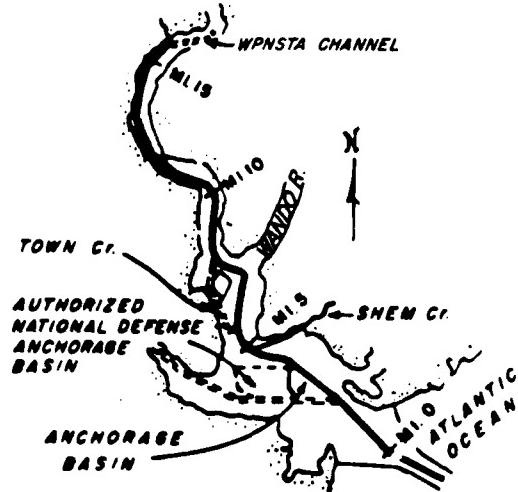
The Naval Weapons Station (WPNSTA) channel extends from the head of the authorized commercial navigation project (vicinity of Goose Creek) upstream 3.48 miles. A channel for the U. S. Navy Noise Measurement Facility extends from the end of the WPNSTA channel 1.0 mile upstream. Both of these channels have a project depth of 35 feet with varying widths.



The Cooper River Rediversion Project was authorized by the River and Harbor Act of 1968 with the view of substantially reducing harbor shoaling. Construction of this project will redirect to the Santee River the major portion of the freshwater originating in the Santee River basin and currently passing through the Pinopolis Hydroelectric Power Plant into the Cooper River and Charleston Harbor. Redirection of this freshwater flow would reduce the current average discharge of 15,600 cfs at Pinopolis to an average of 3,000 cfs. The 3,000 cfs discharge is that flow previous investigations indicated to be a tolerable flow which will not result in harmful sediment trapping density currents. Construction on this project has been initiated and is currently scheduled for completion in calendar year 1985.

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Creek; (c) a connection channel 10 feet deep from Shem Creek to the Atlantic Intracoastal Waterway; (e) a 40-foot National Defense channel from the 40-foot ocean contour to the Commandant's wharf (mile 12.6) with varying widths and an anchorage basin 30 feet deep located between Shutes Folly Island and Fort Sumter, to be prosecuted only as found necessary in the interest of national defense. All project features have been completed except for the 40-foot national defense channel.



The existing authorizations for the Shipyard River provide for commercial navigation with a 30-foot project from the Cooper River to the Union Carbide Property on Shipyard River including two turning basins, one opposite the Gulf Oil Corporation terminal and another at the upper end of the project.

ECONOMIC ANALYSIS

A detailed analysis of the benefits which would be derived from the modification of the Wando River channel is found in Appendix C. Benefits accrue from transportation savings resulting from the difference in the average transportation cost of vessels using the shoaled in 32-foot channel and the average transportation cost for the vessels which would use the deepened channel. Transportation savings derived for the channel depths investigated are:

35 feet - \$ 505,000

38 feet - \$ 785,000

40 feet - \$1,377,000

These are based on the premise that Charleston Harbor will be authorized and constructed to a depth of 40 feet.

COMPARISON OF PLANS

Estimated annual equivalent benefits, annual costs, excess benefits over costs, and the benefit-to-cost ratio are presented in Table 2 for the modification plans. The optimum plan which produces the greatest excess of benefits appears to be Plan 4.

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TABLE 2
PLAN FORMULATION

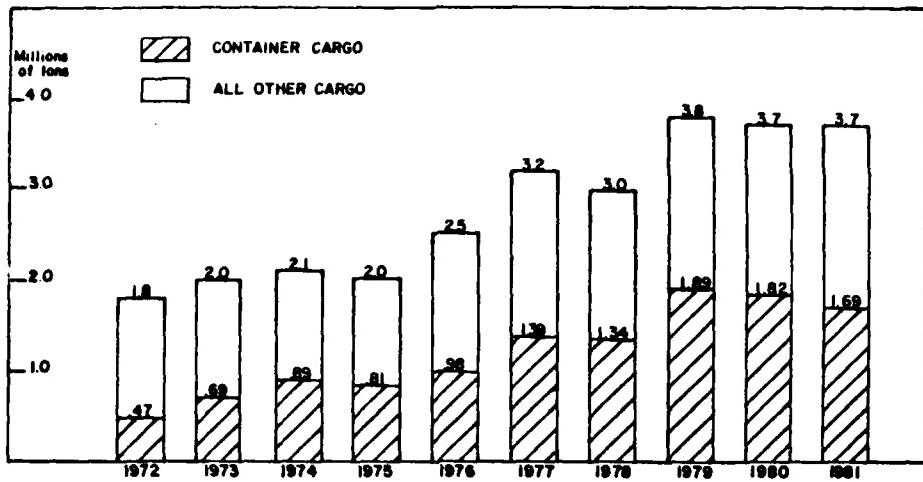
		Annual Equi- valent Benefits	Annual Charges	Excess Benefits over Costs	B/C Ratio
Plan 2	35' X 450'	\$ 505,000	\$237,000	\$ 268,000	2.1
Plan 3	38' X 450'	\$ 785,000	\$415,000	\$ 370,000	1.9
Plan 4	40' X 450'	\$1,377,000	\$552,000	\$ 825,000	2.5

Plan Selection

DISCUSSION

The economic development of South Carolina has grown at a steady rate in the last decade. Much of this economic growth and future development is directly dependent on the Port of Charleston. Despite the economic improvement of the past decade, the state remains near the bottom, 48th, in per capita income. If the much needed favorable economic growth is to continue, the Port of Charleston must remain as a viable and safe harbor adequately serving the future needs of the shipping industry.

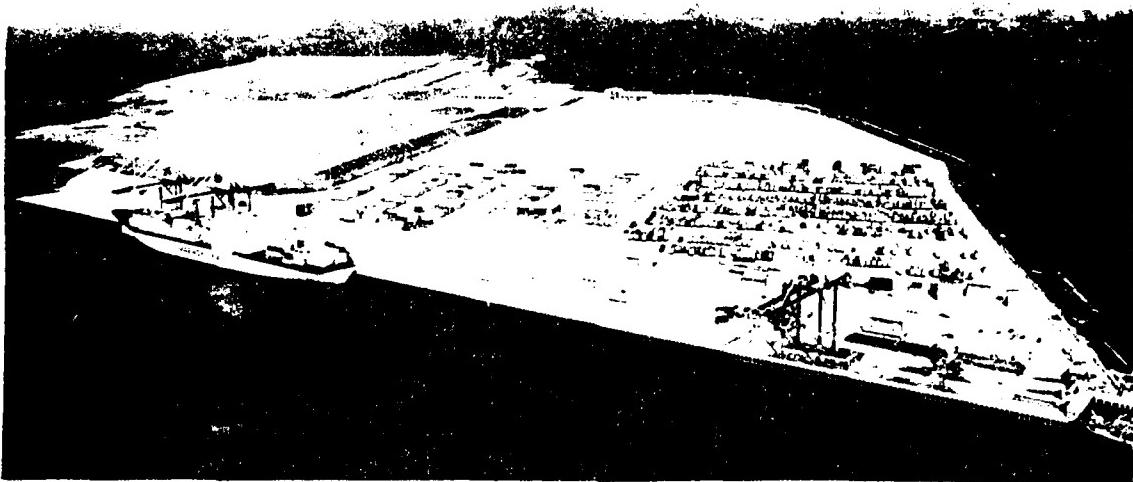
During the past decade, the South Carolina State Ports Authority has made a sustained effort to upgrade and expand its facilities. Of the approximate \$143,000,000 invested, nearly \$71,000,000 went to the development of the Wando River terminal. Due to the efforts of an aggressive SCSPA, commerce over their docks in Charleston has more than doubled during the past decade from 1,767,000 tons in 1972 to 3,696,000 tons in 1981. The chart below illustrates this growth.



A vast expansion of facilities located at three locations on the west bank of the Cooper River did not provide sufficient berthing space and storage area for the rapid increase in commerce, especially container cargo. New areas had to be developed in order for the port to reach its true potential. The SPA investigated various locations to expand their operations and concluded that a site adjacent to Wando River was the only practicable location which would meet their immediate and future needs. This site was purchased in 1972 and, after many delays, a permit to construct the needed terminal facilities was granted.

The completed initial stage of construction is now alleviating overcrowding of facilities on the Cooper River. When development of the Wando site is completed, the facilities will provide sufficient capacity to accommodate the expected growth of the next twenty years. At that time, additional areas, such as Daniel Island, might have to be considered for expansion development.

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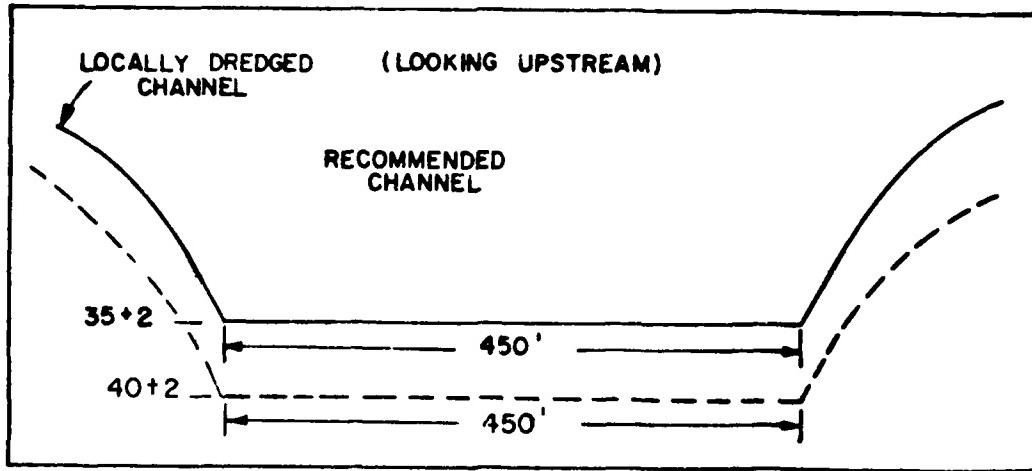


RATIONALE FOR SELECTED PLAN

The need for the State's new facilities on the Wando was very apparent prior to the investment decision. It was also apparent that these facilities would not be functional without a properly sized service channel which the State also provided. Based on the size of vessels using Charleston Harbor a minimum of 35 feet depth was provided.

Various solutions to the problems and the needs of continued harbor development were analyzed. Economic and engineering studies revealed that Plan 4, which provides a 40-foot deep by 450-foot wide channel approximately two miles long with a turning basin at the head, is the NED Plan.

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Transportation savings are the only benefit category used in the justification of the plan. Although no monetary figures have been placed on them, other benefits would accrue to the plan. These include an increased employment and property value, continued diversification of the state's economy, expansion of port activity and related industry, and operational safety. Ocean disposal is the most economical and environmentally satisfactory means of disposing of the dredged material.

Plan Implementation

DIVISION OF RESPONSIBILITIES

The United States would design and prepare detailed plans, deepen the adopted project features, maintain these to project dimensions, and provide necessary aids to navigation. The presently estimated Federal share of the total first cost is \$2,714,000. The annual maintenance costs are estimated at \$223,000 for the 35 X 450-foot channel plus \$69,000 for the modification which would provide a five foot increment of depth.

The a, b, c's of local sponsorship are spelled out in the Recommendations. In addition to these, the State of South Carolina will be required to make a

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cash contribution towards the first costs of construction of the project. This amount has yet to be determined, but will reflect the laws and policies in effect at the time of congressional authorization.

Purchase of disposal areas and the construction of dikes and spillways will not be required of the sponsor if the plan for ocean disposal is implemented. Their costs will be limited to deepening and maintaining berthing areas and possibly to providing a cash contribution towards the first cost presently shown as Federal costs as determined by the Congress. Under present rules, the non-Federal share of the first costs of the selected plan is \$203,000 and \$18,000 annually for maintenance costs, all for the deepening and maintenance of berthing areas.

PUBLIC VIEWS

At a public meeting held 13 December 1979 only minor opposition to the channel extension was voiced, and the opposition was expressed only if the channel size or length shown on the original SCSPA permit was changed. The vast majority of those who attended the meeting spoke in favor of the project.

The selected plan is acceptable to the sponsor. Assurances of non-Federal participation in the recommended improvements are furnished in this report. The draft report was reviewed by various Federal, State and local agencies and interested organizations and individuals. No opposition to the recommended plan was received.

Recommendations

It is recommended that the existing projects for deep draft navigation at Charleston, South Carolina, authorized by the Rivers and Harbors Act of August 1852 and July 1930 and as amended by Senate Document 136, 83rd Congress, 2nd Session, September 1954 and Rivers and Harbors Act of March 1945, respectively, be modified to provide for the maintenance immediately upon authorization of the locally dredged 35-foot deep Wando project with further deepening to 40 feet when other parts of the Charleston Harbor project are deepened to 40 feet in accordance with the plan selected herein, with such modifications as in the discretion of the Chief of Engineers may be advisable; at a first cost to the United States presently estimated at \$2,714,000 and with annual operation, maintenance, and replacement costs to the United States presently estimated at \$292,000, provided that, prior to commencement of construction, nonFederal interests will agree to:

- a. Provide without cost to the United States all lands, easements, and rights-of-way required for construction and subsequent maintenance of the selected or interim plans of improvement and for aids to navigation upon the request of the Chief of Engineers including suitable areas determined by the Chief of Engineers to be required in the general public interest for initial and subsequent disposal of dredged material, as well as the necessary retaining dikes, bulkheads, and embankments or the costs of such works;
- b. Hold and save the United States free from damages that may result from the construction and maintenance of the project, except damages due to the fault or negligence of the United States or its contractors;
- c. Provide and maintain without cost to the United States adequate public terminal and transfer facilities open to all on equal terms;

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d. Provide and maintain without cost to the United States depths in berthing areas and local access channels serving the terminals commensurate with the depths provided in the related project areas;

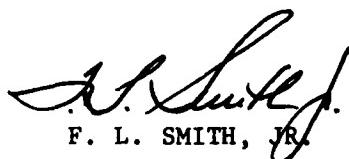
e. Accomplish without cost to the United States all alterations and relocations of buildings, transportation facilities, storm drains, utilities and other structures and improvements made necessary by the construction; and

f. Prohibit the erection of structures within 125 feet of the bottom edge of the recommended Federal project channels or turning basins.

On July 15, 1981 the Department of the Army, on behalf of the Administration, transmitted proposed legislation to Congress that would provide for full recovery of certain operation, maintenance and construction or rehabilitation costs for deep draft channels and ports with authorized depths greater than 14 feet. If this legislation is enacted, Corps of Engineers expenditures for the Wando River Deep Draft Navigation Project will be subject to recovery as provided in the proposed legislation. Accordingly, non-Federal interests would be required to reimburse the Federal government for construction of navigation features of the recommended plan and all subsequent expenditures for operation, maintenance and rehabilitation except for expenditures assigned by the Secretary of the Army to governmental vessels in non-commercial service.

The entire amount of the Federal construction or rehabilitation expenditures to be reimbursed, including interest during construction and interest on the unpaid balance would be reimbursed within the life of the project, but in no event to exceed fifty years after the date the project becomes available for use. The interest rate for reimbursement purposes would be determined by the Secretary of the Treasury based on the average market yields on outstanding obligations of the United States. Reimbursements for operation and maintenance would be made annually and may be scheduled and periodically adjusted to result in the payment of actual operation and maintenance costs. The nonFederal public

body would be authorized to recover its reimbursement obligations pursuant to this requirement by the collection of fees for the use of the project by vessels in commercial waterway transportation.



F. L. SMITH, JR.
LTC, Corps of Engineers
District Engineer

SUPPLEMENTAL ANALYSIS OF COST RECOVERY IMPACT
REQUIRED BY EC 1105-2-124, 16 DECEMBER 1983

1. It is required to analyze the impact of having the shippers of benefittonnage pay certain port-specific user fees in order to recover certain costs. The costs to be recovered (in this analysis) are (1) fifty percent of the first cost of the project improvement and its interest during construction, and (2) one hundred percent of the first cost of the project improvement and its interest during construction. These are to be recovered over the economic life of the improvement but not to exceed 50 years. The discount rate to be used is 6.5 percent. Costs and benefits are to be adjusted to the 30 September 1983 level. Construction costs are to be inflated 8 percent per year, from October 1983 until "in place." Transportation costs and benefits are to be inflated 4.5 percent per year, from 1 October 1983 through the analysis period.
2. Costs to be recovered. This assumes a six-month period of construction, immediately prior to 1 January 1990. The estimated (Federal) first cost is \$2,716,000. Construction is to begin 1 July 1989, which is 5 3/4 years from 1 October 1983, and costs are to increase 8 percent annually in the interim, or to \$4,227,815 (from $\$2,716,000 \times (1.08)^{5.75}$). Construction will require six months, and the monthly rate of interest during construction will be $0.065/12 = 0.005417$ (or 0.5417 percent). The compound amount factor is: $(1/6)[(1.005417)^6 - 1]/(0.005417) = 1.0135683$. Hence, interest during construction is 1.35% or 57,385, and the total of first cost and interest during construction is \$4,285,200. Thus the amount to be recovered at 100 percent recovery is \$4,285,200 and at 50 percent recovery is \$2,142,600. If this were a debt to be extinguished by 50 annual payments, with an interest rate of 6.5 percent, the annual payments would be \$290,957 and \$145,479, respectively.

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3. Analysis of fees. The cargo is containerized, and it is difficult to obtain tonnage by commodities. The analysis is shown in Table A, which will be discussed here only with respect to the 50 percent recovery of costs. The report uses a discount rate of 8 1/8 percent, and with the pattern of benefits shown in line 2 derives an annual equivalent value of \$1,377,000. If the discount rate were 6.5 percent, the annual benefits would be \$1,465,800 annually. As noted above, 50 percent recovery would entail annual receipts of \$145,479. For the first year (1990) this would be a fee of \$0.1272/ton. At this rate per ton, payoff would occur in year 2000 (10 years). At a somewhat lesser rate per ton, it would require the full 50 years for payoff. This rate can be estimated to be \$0.0688/ton, at a discount rate of 6.5 percent; at that rate, the amount of the payments in the first year (1990) is \$78,686. It is therefore concluded that cost recovery is so small it would not cause any shift in tonnage to other ports.

4. Effect on project justification. A commodity by commodity analysis is virtually impossible with containerized cargo. At a 6.5 percent discount rate, the annual gross benefits are the above-cited \$1,465,800, and the equivalent annual recovery via fees (50 percent recovery) is the above-cited \$145,479. From the point of view of the shipper, the net benefits are the difference, or \$1,320,310 per year. The annualized project costs, at a discount rate of 6.5 percent, are \$719,500, including maintenance, etc. Using the above net benefits, the benefit-cost ratio is 1.8 (which is \$1,320,310/\$719,500). This compares with the benefit-cost ratio of 2.5 in the project authorization analysis (at 8 1/8 percent), which is \$1,377,100/\$552,000. Similarly, the case of 100 percent recovery, the benefits would be \$1,465,800 - \$290,457 = \$1,174,843, and the annualized costs (at 6.5 percent) would be \$719,500, as before. Using these net benefits, the benefit-cost ratio would be 1.6 (\$1,174,843/\$719,500).

TABLE A

WANDO RIVER: ANALYSIS OF IMPACT OF PORT-SPECIFIC FEES

	1990 ^{1/}	2000	2010	2020	2030	2040
Savings, uninflated (\$/ton)	0.31	0.72	0.80	0.84	0.90	1.00
Projected Asian Commerce (tons/1,000)	1,143.7	2,465.1	2,490.0	2,490.0	2,490.0	2,490.0
Total Savings (Benefits) (\$/1,000) ^{2/}	354.6	1,774.9	1,992.0	2,091.0	2,241.0	2,490.0
Inflated Benefits ^{3/} (\$/1,000)	466.9	3,629.1	6,325.4	10,311.4	17,162.0	29,613.5
Inflated Savings (\$/ton) (compare: line 1)	0.41	1.49	2.54	4.13	7.66	11.89
Fees, with 50 Percent Recovery:						
Annual Fees at \$0.1272/ton ^{4/}	145,479	313,561	316,728			
Fees as % of uninflated benefits	41.0	17.7	15.9			
Fees, with 100 Percent Recovery:						
Annual Fees at \$0.2544/ton ^{5/}	290,957	627,121	633,456			
Fees as % of uninflated benefits:	82.0	35.3	31.8			

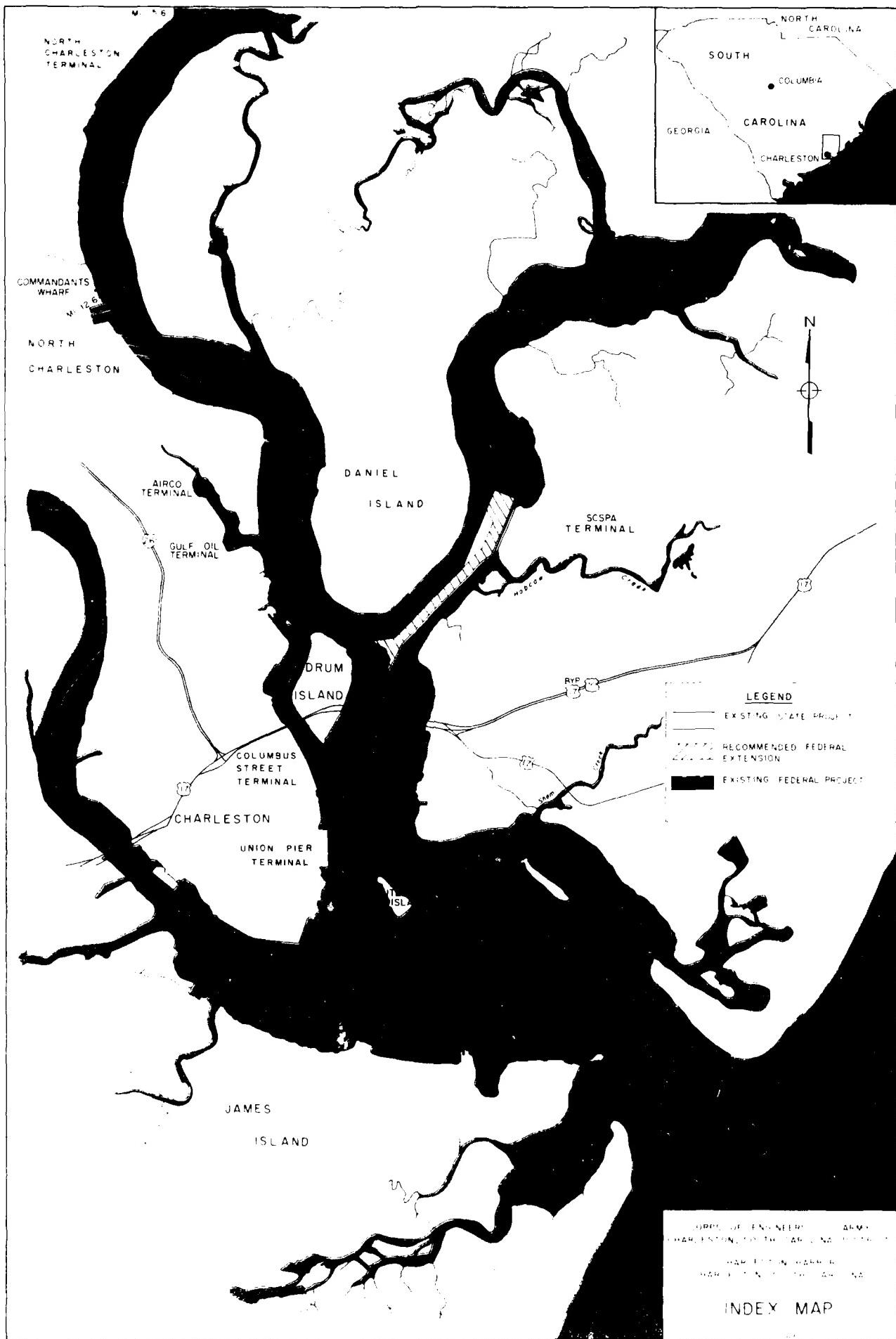
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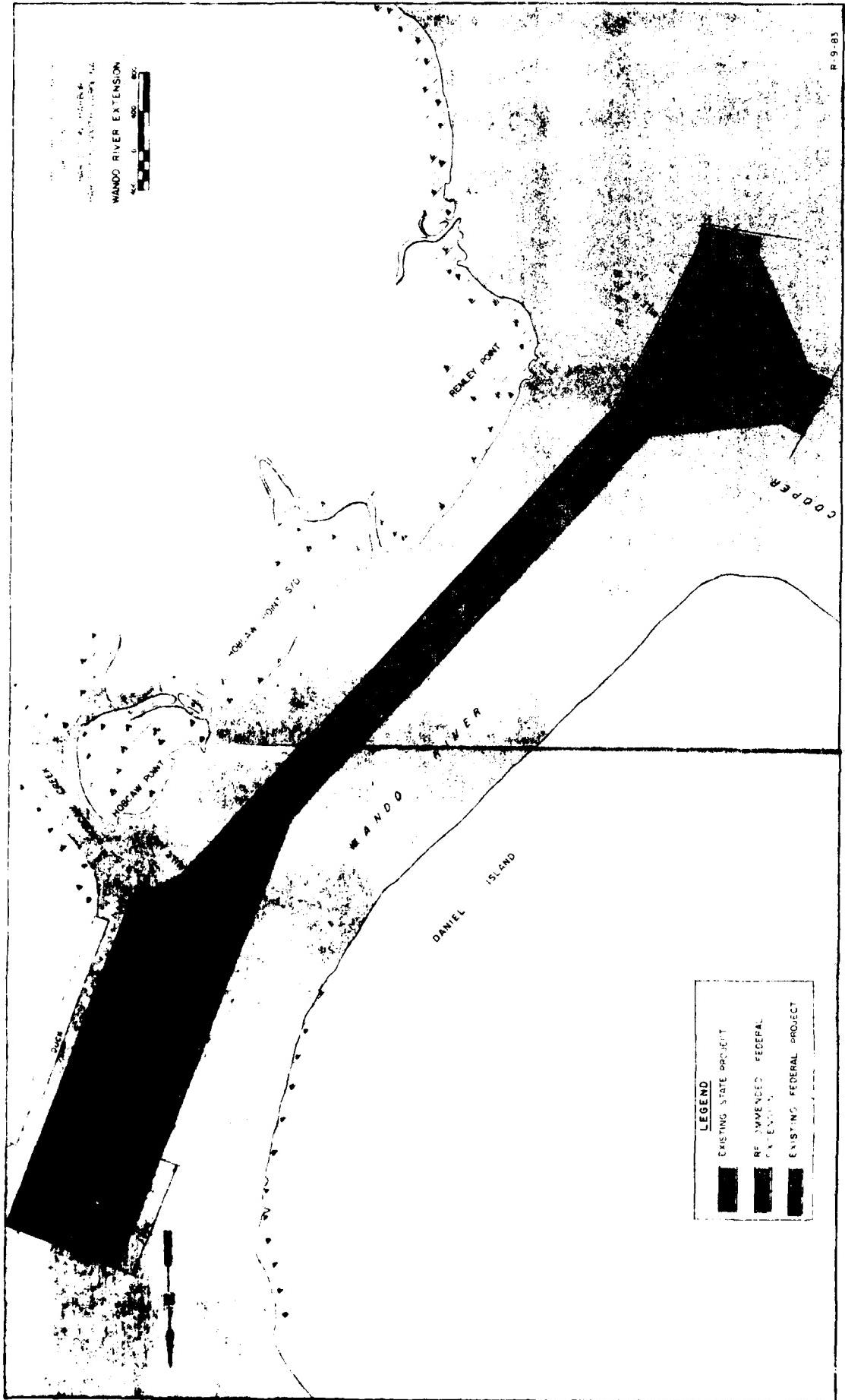
Project Operation begins 1 Jan 1990; 1990 is first year of operation.
^{2/} This pattern of benefits, at a discount rate of 6.5% has an annual equivalent value of \$1,465,800, and at a discount rate of 8 1/8%, has an annual equivalent value of \$1,377,000. The price level is that of 1 Oct 83.
^{3/} Inflated at 4.5%/year from 1 Oct 83. E.g.: 466.9 = 354.6(1.045)^{6.25}; 3,629.1 = 1,774.9(1.045)^{16.25}, etc.
^{4/} At a discount rate of 6.5%, the annual equivalent value of these benefits is \$4,995,170.
^{5/} Fifty percent of the First Cost and Interest during construction is \$2,142,600. The annual fee receipt to recover this in 50 years is \$145,479, or 2,142,600 X 0.067914. This gives a first-year fee of \$0.1272/ton and a fee in the year 2000 of \$0.0597/ton. But since it is desired to have a constant fee per ton, this has been taken to be \$0.1272/ton.

As a consequence of not having the fee drop from the initial value of \$0.1272/ton, full recovery of the 50 percent will occur about year 2000; hence the \$316,728 shown for 2010 has no real meaning. The question arises: In order to recover the \$2,142,600 in 50 years (and no sooner) what constant fee/ton should be used? This is calculated to be \$0.0688/ton, which has a first-year (1990) value of \$78,686.

^{6/} One hundred percent of the First Cost and Interest during construction is \$4,285,200, the annual fee receipt to recover this in 50 years is \$290,953, or 4,285,200 X 0.067914. This gives a first-year fee of \$0.2544/ton, and a fee in the year 2000 of \$0.118/ton. But since it is desired to have a constant fee per ton, this has been taken to be \$0.2544/ton.

As a consequence of not having the fee drop from the initial value of \$0.2544/ton, full recovery of the 100 percent will occur about year 2000, as above; hence the \$633,456 shown for 2010 has no real meaning. Again, the question arises: In order to recover the \$4,285,200 in 50 years (and no sooner), what constant fee/ton should be used? This is calculated to be \$0.1375/ton, which has a first-year (1990) value of \$157,259.





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